PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

To:

Assistant Commissioner for Patents
United States Patent and Trademark Office
Box PCT
Washington, D.C.20231
ETATS-UNIS D'AMERIQUE

in its capacity as elected Office

Date of mailing (day/month/year) 20 September 2000 (20.09.00)	
International application No. PCT/FI99/01083	**Applicant's or agent's file reference** 2980715PC/nu
International filing date (day/month/year) 28 December 1999 (28.12.99)	**Priority date** (day/month/year) 31 December 1998 (31.12.98)

Applicant

PUUSKARI, Mikko

1. The designated Office is hereby notified of its election made:

   [X] in the demand filed with the International Preliminary Examining Authority on:

   24 July 2000 (24.07.00)

   [ ] in a notice effecting later election filed with the International Bureau on:

2. The election [X] was

   [ ] was not

   made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland	Authorized officer Claudio Borton
Facsimile No.: (41-22) 740.14.35	Telephone No.: (41-22) 338.83.38

Form PCT/IB/331 (July 1992)

FI9901083

INTERNATIONAL SEARCH REPORT

A. CLASSIFICATION OF SUBJECT MATTER

IPC7: H04Q 7/22, H04L 12/56

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: H04Q

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
E,X	WO 14981 A1 (TELIA AB (PUBL)), 16 March 2000 (16.03.00), see the whole document	1,10-12, 14-15,17
A	US 5752162 A (STEVEN PAUL SAWYER ET AL), 12 May 1998 (12.05.98), column 2, line 66 - column 5, line 13	1,10,14,17
A	WO 9859468 A2 (NOKIA TELECOMMUNICATIONS OY), 30 December 1998 (30.12.98), page 6, line 6 - line 22	1,10,14,17

☐ Further documents are listed in the continuation of Box C.   ☒ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" erlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
8 June 2000	0 9 -06- 2000
Name and mailing address of the ISA/ Swedish Patent Office Box 5055, S-102 42 STOCKHOLM Facsimile No. + 46 8 666 02 86	Authorized officer Jaana Raivio/mj Telephone No. + 46 8 782 25 00

Form PCT/ISA/210 (second sheet) (July 1992)

Patent document cited in search report	Publication date	Patent family member(s)		Publication date
WO 14981 A1	16/03/00	NONE		
US 5752162 A	12/05/98	BR	9603750 A	02/06/98
		IT	1286340 B	08/07/98
		IT	RM960685 A	09/04/98
WO 9859468 A2	30/12/98	AU	7920998 A	04/01/99
		EP	0920761 A	09/06/99
		FI	972725 A	25/12/98

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

WIPO   PCT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 2980715PC/nu	**FOR FURTHER ACTION**	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
International application No. PCT/FI99/01083	International filing date *(day/month/year)* 28/12/1999	Priority date *(day/month/year)* 31/1/1998

International Patent Classification (IPC) or national classification and IPC7 H04Q 7/22, H04L 12/56

Applicant Nokia Networks OY, et al

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1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of ___4___ sheets, including this cover sheet.

    ☐ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

    These annexes consist of a total of _____ sheets.

3. This report contains indications relating to the following items:

    I   ☒ Basis of the report

    II ☐ Priority

    III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

    IV ☐ Lack of unity of invention

    V   ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

    VI ☒ Certain documents cited

    VII ☐ Certain defects in the international application

    VIII ☐ Certain observations on the international application

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Date of submission of the demand 24/07/2000	Date of completion of this report 18/12/2000
Name and mailing address of the IPEA/SE Patent- och registreringsverket Telex Box 5055 17978 S-102 42 STOCKHOLM PATOREG-S Facsimile No. 08-667 72 88	Authorized officer Jaana Raivio/JAn Telephone No. 08-782 25 00

Form PCT/IPEA/409 (cover sheet) (January 1998)

I. Basis of the report

1. With regard to the **elements** of the international application:*

☒ the international application as originally filed

☐ the description:

pages _____ , as originally filed

pages _____ , filed with the demand

pages _____ , filed with the letter of _____

☐ the claims:

pages _____ , as originally filed

pages _____ , as amended (together with any statement) under article 19

pages _____ , filed with the demand

pages _____ , filed with the letter of _____

☐ the drawings:

pages _____ , as originally filed

pages _____ , filed with the demand

pages _____ , filed with the letter of _____

☐ the sequence listing part of the description:

pages _____ , as originally filed

pages _____ , filed with the demand

pages _____ , filed with the letter of _____

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.
These elements were available or furnished to this Authority in the following language _____ which is:

☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).

☐ the language of publication of the international application (under Rule 48.3(b)).

☐ the language of the translation furnished for the purposes of international preliminary examination (under Rules 55.2 and/ or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

☐ contained in the international application in written form.

☐ filed together with the international application in computer readable form.

☐ furnished subsequently to this Authority in written form.

☐ furnished subsequently to this Authority in computer readable form.

☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. ☐ The amendments have resulted in the cancellation of:

☐ the description, pages _____

☐ the claims, Nos. _____

☐ the drawings, sheet/fig _____

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2 (c)).**

* *Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are annexed to this report since they do not contain amendments (Rules 70.16 and 70.17).*

** *Any replacement sheet containing such amendments must be referred to under item I and annexed to this report.*

Form PCT/IPEA/409 (Box I) (January 1998)

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1-19	YES
	Claims		NO
Inventive step (IS)	Claims	1-19	YES
	Claims		NO
Industrial applicability (IA)	Claims	1-19	YES
	Claims		NO

2. Citations and explanations (Rule 70.7)

The claimed invention relates to a method for selecting a gateway support node to be used in a telecommunications system. A gateway support node may suggest another more suitable gateway support node with which the tunnel should be established to the serving support node. This suggestion may be made when it rejects a request for establishing a tunnel or when the conditions change so that it is practical to remove the existing tunnel (for example if the operator wants to divide the traffic load).

Documents cited in the International Search Report:
D1: US 5 752 162
D2: WO 98 59468

D1 discloses a method for assigning a subscriber unit to a visited gateway. The gateway is selected from a list based on which alternate gateway is the best choice, where the choice is based on for example factors as the location of the subscriber unit or if the gateway is capable of servicing the connection request.

D2 relates to a method for re-routing a connection in a telecommunications system. Instead of establishing a new connection, the context information is modified only in those network elements that change in routing aspects.

Documents D1-D2 are considered to constitute the state of the art. None of D1-D2 show the feature of defining a condition, so that when the condition is fulfilled a second gateway support node is more suitable for transmitting packets. The invention as claimed in claims 1-19 is, with reference to D1-D2, novel and considered to involve an inventive step. The invention as claimed in claims 1-19 is considered to have industrial applicability.

VI. Certain documents cited

1. Certain published documents (Rule 70.10)

Application No. Patent No.	Publication date *(day/month/year)*	Filing date *(day/month/year)*	Priority date (valid claim) *(day/month/year)*
WO0014981	16/03/2000	06/09/1999	

2. Non-written disclosures (Rule 70.9)

Kind of non-written disclosure	Date of non-written disclosure *(day/month/year)*	Date of written disclosure referring to non-written disclosure *(day/month/year)*

Original (for **SUBMISSION**) - printed on 28.12.1999 01:03:15 PM

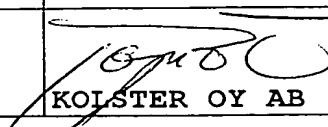| 0 0-1	For receiving Office use only International Application No.	PCT/FI 9 9 / 0 1 0 8 3
0-2	International Filing Date	2 8 DEC 1999 (2 8. 12. 99)
0-3	Name of receiving Office and "PCT International Application"	The Finnish Patent Office PCT International Application
0-4 0-4-1	Form - PCT/RO/101 PCT Request Prepared using	PCT-EASY Version 2.90 (updated 15.10.1999)
0-5	Petition The undersigned requests that the present international application be processed according to the Patent Cooperation Treaty	
0-6	Receiving Office (specified by the applicant)	National Board of Patents and Registration (Finland) (RO/FI)
0-7	Applicant's or agent's file reference	2980715PC/nu
I	Title of invention	CONTROL OF GATEWAY SUPPORT NODE SELECTION
II II-1	Applicant This person is:	applicant only
II-2	Applicant for	all designated States except US
II-4	Name	NOKIA NETWORKS OY
II-5	Address:	Keilalahdentie 4 FIN-02150 Espoo Finland
II-6	State of nationality	FI
II-7	State of residence	FI
III-1 III-1-1	Applicant and/or inventor This person is:	applicant and inventor
III-1-2	Applicant for	US only
III-1-4	Name (LAST, First)	PUUSKARI, Mikko
III-1-5	Address:	Angervotie 5 C 35 FIN-00320 Helsinki Finland
III-1-6	State of nationality	FI
III-1-7	State of residence	FI

PCT REQUEST

2980715PC/nu

IV-1	Agent or common representative; or address for correspondence The person identified below is hereby/has been appointed to act on behalf of the applicant(s) before the competent International Authorities as:	agent
IV-1-1	Name	KOLSTER OY AB
IV-1-2	Address:	Iso Roobertinkatu 23 P.O. Box 148 FIN-00121 Helsinki Finland
IV-1-3	Telephone No.	358 9 618 821
IV-1-4	Facsimile No.	358 9 602 244
IV-1-5	e-mail	kolster@kolster.fi
V	**Designation of States**	
V-1	Regional Patent (other kinds of protection or treatment, if any, are specified between parentheses after the designation(s) concerned)	AP: GH GM KE LS MW SD SL SZ TZ UG ZW and any other State which is a Contracting State of the Harare Protocol and of the PCT EA: AM AZ BY KG KZ MD RU TJ TM and any other State which is a Contracting State of the Eurasian Patent Convention and of the PCT EP: AT BE CH&LI CY DE DK ES FI FR GB GR IE IT LU MC NL PT SE and any other State which is a Contracting State of the European Patent Convention and of the PCT OA: BF BJ CF CG CI CM GA GN GW ML MR NE SN TD TG and any other State which is a member State of OAPI and a Contracting State of the PCT
V-2	National Patent (other kinds of protection or treatment, if any, are specified between parentheses after the designation(s) concerned)	AE AL AM AT (patent and utility model) AU AZ BA BB BG BR BY CA CH&LI CN CR CU CZ (patent and utility model) DE (patent and utility model) DK (patent and utility model) DM EE (patent and utility model) ES FI (patent and utility model) GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR (patent and utility model) KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX NO NZ PL PT RO RU SD SE SG SI SK (patent and utility model) SL TJ TM TR TT TZ UA UG US UZ VN YU ZA ZW

PCT REQUEST

2980715PC/nu

10-3	Corrected date of actual receipt due to later but timely received papers or drawings completing the purported international application	
10-4	Date of timely receipt of the required corrections under PCT Article 11(2)	
10-5	International Searching Authority	**ISA/SE**
10-6	Transmittal of search copy delayed until search fee is paid	

FOR INTERNATIONAL BUREAU USE ONLY

11-1	Date of receipt of the record copy by the International Bureau	

PCT

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(54) Title: CONTROL OF GATEWAY SUPPORT NODE SELECTION

(57) Abstract

The invention relates to controlling selection of a gateway support node of a packet–switched network. The invention comprises defining at least one condition (202, 203, 204) for the gateway support node. When the condition is fulfilled, another gateway support node is more suitable for transmitting packets. When fulfilment of the condition is detected, a first message indicating the other gateway support node is transmitted (215) to the serving support node.

CONTROL OF GATEWAY SUPPORT NODE SELECTION

BACKGROUND OF THE INVENTION

5 The invention relates to controlling selection of a gateway support node in a packet-switched network, and particularly to controlling selection of a packet-switched gateway support node in a mobile communication network.

Mobile communication networks function as effective access networks which provide the users with access to the actual data networks for mobile data transmission. Mobile data transmission is supported particularly

10 well by digital mobile communication systems, such as the pan-European mobile communication system GSM (Global System for Mobile Communication). In this application the term 'data' refers to any information transmitted in a digital telecommunications system. Such information may comprise digitally encoded audio and/or video, inter-computer data traffic,

15 telefax data, short sections of program codes, etc.

General packet radio service GPRS is a new service for the GSM system and one of the issues standardized by ETSI (European Telecommunication Standard Institute) in GSM phase 2+. The GPRS service enables packet data transmission between mobile data terminals and external

20 data networks, while the GSM network functions as an access network. One of the requirements set on the GPRS service is that it should cooperate with different external data networks, such as the Internet or X.25 networks. In other words, the GPRS service and the GSM network should be able to serve all users regardless of the type of the data network they want to attach to via

25 the GPRS service. This means that the GPRS service must support and process different network addresses and data packet forms. Processing of data packets also comprises routing of them in a packet radio network. Furthermore, the users should be able to roam from the home GPRS network to a visiting GPRS network the operator of which may have a backbone

30 network supporting a different protocol (e.g. CLNP) than the home network (e.g. X.25). The logical network architecture of the GPRS service is illustrated in Figure 1.

Figure 1 illustrates the network architecture of a GPRS service at a general level because the detailed structure of the network is irrelevant to the

35 invention. The GPRS service comprises an access network which provides

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radio access and is the base station subsystem BSS of the GSM system in Figure 1, and support nodes of the GPRS service for packet-switched transmission of packet-switched data between a packet network PDN and a mobile station MS. The support nodes include a serving GPRS support node
5   SGSN and a gateway GPRS support node GGSN. These different support nodes SGSN and GGSN are interconnected by a backbone network. It should be noted that the functionalities of the SGSN and the GGSN can also be physically combined into the same network node. Logically the nodes are, however, separate nodes.
10   The serving GPRS support node SGSN serves the mobile station MS. Each support node SGSN manages a packet data service within the area of one or more cells in a cellular packet radio network. For this purpose, each support node SGSN is typically connected to a base station subsystem BSS. The mobile station MS in a cell communicates with a base station over the
15   radio interface and further through the base station subsystem with the support node SGSN to the service area of which the cell belongs.
         The gateway GPRS support node GGSN connects the GPRS service of an operator to other data networks PDN, such as an IP network (Internet, Intranet) or X.25 network. The GGSN includes the routing
20   information on GPRS subscribers, i.e. SGSN addresses and addresses of the external network related to the PDP contexts. The GGSN functions as a router between the external address and the internal routing information (e.g. SGSN). The GGSN may also transmit packets from one mobile station to another within the network.
25   A subscriber to the GPRS service has one or more external PDP addresses available. The PDP address is used for identifying a certain user context from the external network. A mobile station attached to the GPRS service may receive and/or transmit data packets with a certain PDP address provided that a corresponding packet data protocol PDP context is activated in
30   the mobile station, serving support node and gateway support node. Activation of the PDP context establishes a tunnel between the support node SGSN serving the mobile station and the gateway support node GGSN. The tunnel is established using a GPRS tunnelling protocol GTP between the SGSN and the GGSN. The prior art tunnelling protocol is disclosed in ETSI specification
35   GSM 09.60, version 6.2.0 (Digital cellular telecommunications system (Phase 2+); General Packet Radio Service (GPRS); GPRS Tunnelling Protocol (GTP)

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across the Gn and Gp Interface). The tunnel is established in such a manner that the SGSN sends a 'Create PDP Context' request to the GGSN which either accepts or rejects it. If the GGSN accepts the create request, the tunnel is established. If the GGSN rejects the create request, the SGSN either sends

5   the create request to the next GGSN (if it has information on it) or informs the mobile station of the fact that the context cannot be activated. Selection of the next GGSN by the serving support node SGSN is based on static lists which are maintained e.g. in the internal name server of the GPRS service. After the tunnel has been established, the gateway support node GGSN can only either

10   reject or accept any update requests made by the serving support node or request the serving support node to remove the tunnel.

A problem related to the arrangement described above is that the gateway support node GGSN cannot at any stage indicate another gateway support node to the serving support node which would be a more suitable

15   gateway support node.

BRIEF DESCRIPTION OF THE INVENTION

An object of the invention is to provide a method and an apparatus implementing the method to eliminate the above-mentioned problems. The objects of the invention are achieved with a method, telecommunications

20   system and support nodes of a packet network which are characterized by what is disclosed in the independent claims. The preferred embodiments of the invention are described in the dependent claims.

The invention is based on the idea that the gateway support node suggests another more suitable gateway support node with which the tunnel

25   should be established to the serving support node. The gateway support node may make the suggestion either when it rejects the request for establishing a tunnel or when the conditions change so that it is practical to remove the existing tunnel.

An advantage of the method, system and support nodes of the

30   invention is that the operator can distribute the load dynamically to the gateway support nodes in the network and transfer the tunnel between the SGSN and the gateway support node to another gateway support node depending on the conditions, e.g. in connection with handover of serving support nodes.

In a preferred embodiment of the invention the messages which are sent to the serving support node and indicate the most suitable gateway support node are response messages to the 'Create PDP Context' request. A further advantage of this embodiment is that it is extremely simple to implement: one parameter/attribute is added to an existing message. This enables gradual introduction of the feature into a network, and thus both old serving support nodes lacking the inventive functionality and new serving support nodes with the functionality of the invention can be used simultaneously in the network without interfering with its function.

In a preferred embodiment of the invention where the end of an existing tunnel is to be transferred from one gateway support node to another, the tunnel is removed in the gateway support node only in response to a positive acknowledgement. A further advantage of this embodiment is that packets are not lost if there has not been time to establish a tunnel between the other gateway support node and the serving support node. This embodiment also allows to ensure at least satisfactory transmission of packets.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will be described in greater detail by means of preferred embodiments with reference to the accompanying drawings, in which

Figure 1 illustrates the essential parts of the logical network architecture of a packet radio network;

Figure 2 is a flow chart illustrating the function of a first preferred embodiment according to the invention in a serving support node;

Figure 3 is a flow chart illustrating the function of a second preferred embodiment according to the invention in a serving support node;

Figure 4 is a signalling chart illustrating establishment of a tunnel according to the invention;

Figures 5 and 6 are signalling charts illustrating how one end of the tunnel is transferred from one gateway support node to another.

DETAILED DESCRIPTION OF THE INVENTION

The present invention is applicable to any packet-switched system which utilizes the tunnelling technique between the gateway support node and the serving support node. These include the third-generation mobile communication systems, such as the Universal Mobile Telecommunications

System (UMTS) and IMT-2000 (International Mobile Telecommunications 2000), mobile communication systems corresponding to the GSM system, such as the DCS 1800 (Digital Cellular System for 188 MHz) and PCS (Personal Communication System), and WLL systems which are based on the

5   above-mentioned systems and implement a GPRS type packet radio. However, the invention has been described using the GPRS service of the GSM system as an example, but naturally the invention is not limited to such a system. The definitions of mobile communication systems change rapidly, which may necessitate additional changes to the invention. For this reason, all

10   the terms and expressions should be interpreted broadly, and it should also be kept in mind that they are only intended to describe the invention, not to limit it.

The subnetwork BSS, network elements SGSN and GGSN and external packet data network PDN shown in Figure 1 were described in greater detail above. The structure and function of the GSM system are very

15   familiar to a person skilled in the art. The structure of the GPRS service, for example, is defined in ETSI specification 03.60, version 6.0.0 (Digital cellular telecommunications system (Phase 2+); General Packet Radio Service (GPRS); Service Description; Stage 2). The example shown in Figure 1 illustrates the fact that the SGSN may communicate with the packet data

20   network PDN via several gateway support nodes GGSN1, GGSN2, GGSN3. These gateway support nodes may also be located in different mobile communication networks PLMN A and PLMN B. One GGSN may similarly communicate with several serving support nodes SGSN, even though this is not illustrated in the figure.

25   In addition to the prior art functions, the support nodes SGSN and GGSN of the system according to the invention are arranged to perform the functions to be explained in connection with Figures 2 to 6. They comprise processors and memory which can be utilized in the functions of the invention. All changes needed to implement the invention can be carried out as

30   additional or updated software routines.

In addition, the system may comprise means for storing recommendable gateway support nodes in the memory. The memory means are preferably located in a centralized database DB. The memory means or some of them may also be divided between the network elements, e.g. each

35   gateway support node GGSN may have a list of its own. In the latter case the gateway support nodes GGSN may also need additional memory. The

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information in the database can be updated e.g. via network management (not shown). For example, the recommended gateway support nodes can be stored so that each gateway support node SGSN has a list of its own from which a suitable support node is selected according to the features and available resources. The way in which the lists are maintained or the grounds on which the selection is made is irrelevant to the invention. It is essential that the gateway support node receives, when needed, information on a better/more recommendable gateway support node. It may also receive this information directly from the operator, and thus the memory is not necessary.

Figure 2 is a flow chart illustrating the function of the gateway support node GGSN according to the first preferred embodiment of the invention in respect of one PDP context. In step 201 a 'Create PDP Context' request (or Create AA PDP Context request) is received from the serving support node. In step 202 it is checked whether the gateway support node supports the desired service, such as an IP-based connection or a connection to a certain company network. If the gateway support node supports the desired service, it is checked in step 203 whether the gateway support node can provide the necessary capacity, e.g. the desired quality of service. If the gateway support node is capable of offering the necessary capacity, it is checked in step 204 whether the load of the gateway support node is below the limit value set by the operator. The operator may set a fixed limit value or change it according to the load. For example, when there is a lot of traffic in the network, the limit value may be 95% of the maximum load, but if the amount of traffic is small, the limit value may be changed to 50% of the maximum load. If the load is smaller than the limit value, a positive response is sent to the serving support node in step 205 (Create PDP Context Response (request accepted) or Create AA PDP Context Response (request accepted)). Thereafter it is checked in step 206 whether the PDP context already exists. If there is no PDP context, it is created in step 207. If a PDP context exists, it is updated in step 208.

From steps 207 and 208 we move to step 209 where the situation of the gateway support node is monitored. During monitoring it is checked in step 210 whether the situation is OK. This is found out e.g. by comparing the load and the limit value. The limit value can be changed even though a tunnel would already exist to divide the load between the gateway support nodes. If the situation is OK, we continue monitoring. If the situation is not OK, e.g. the

load situation changes and the operator wants to divide the load, the address of a more recommendable GGSN is retrieved in step 211. Thereafter in step 212 the serving support node is informed of the fact that the gateway support node has to be changed. The information to be sent includes the address of the recommended gateway support node. In the first preferred embodiment step 212 is performed by sending a negative response which includes information on the gateway support node recommended by the gateway support node (Create PDP Context Response (cause, GGSN2) or Create AA PDP Context Response (cause, GGSN2)). In other words, in the first preferred embodiment the GGSN may send the same message as when responding to the Create PDP Context request even when the PDP context is activated and the tunnel exists. In other embodiments another message may also be sent to transfer the end of the tunnel. Alternative messages include Delete PDP Context Request (GGSN2) and Reset PDP Context GGSN2. In the first preferred embodiment the PDP context is deleted in step 213 after the negative response has been sent.

If it is noted in step 202 that the requested service is not supported, we move to step 214 to retrieve the address of the more recommendable GGSN. Then a negative response including information on the gateway support node recommended by the gateway support node (Create PDP Context Response (cause, GGSN2) or Create AA PDP Context Response (cause GGSN2)) is sent in step 215. Thereafter it is checked in step 216 whether a PDP context already exists, and if there is a PDP context, it is deleted in step 217. In some other embodiments the PDP context is not necessarily deleted in step 217, but the PDP context is either retained or deleted, depending on the case and the purpose of use. The tunnel, however, is removed. The same can also be done in step 213.

If there is no capacity available, we move to step 214 from step 203. If the load is not below the limit value, we move to step 214 from step 204.

When the load is calculated, the level of quality of service, i.e. QoS level, wished for the context in question can also be taken into account. In that case the desired QoS parameter values sent in the request are checked and it is evaluated whether the desired quality of service can be reached/guaranteed in step 204. If the desired quality of service cannot be reached or guaranteed,

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it is possible to indicate a GGSN which could support the desired service better.

Steps 203, 204 and 205 exemplify some conditions which the operator may define to distribute the load or to use the gateway support nodes supporting different services. The conditions for rejecting creation of a context may differ from what has been described above. The conditions may also vary according to the load situation or be independent of the load situation. Furthermore, the conditions may be defined separately for each gateway support node or the conditions or some of them may be defined jointly e.g. in a database which includes the lists of the most recommendable gateway support nodes. The condition may be gateway support node-specific, such as a supported service, or common to all gateway support nodes of the same operator. A common condition could be e.g. that the tunnel of a visiting mobile station is established in the home network. For example, if the mobile station MS is a subscriber of the PLMN B network in the situation illustrated in Figure 1, the condition defined for the GGSN1 or GGSN 2 (or for them in a database, for example) may be that the subscribers of the PLMN B are routed to the GGSN3. It is essential that at least one condition has been defined and the GGSN is given the address of another GGSN which it may include in the negative response.

In some other preferred embodiments of the invention transfer of the tunnel end to another gateway support node, i.e. steps 209, 210, 211, 212 and 213, can be omitted.

Figure 3 is a flow chart illustrating the function of the serving support node SGSN according to the first preferred embodiment of the invention in respect of one PDP context. In step 301 a negative response to the 'Create PDP Context' request is received from the serving support node (Create PDP Context Response (cause) or Create AA PDP Context Response (cause)). In step 302 it is checked whether the corresponding PDP context is active. If it is, it is set to wait for a response in step 303 after which we move to step 304. If the PDP context is inactive, we move to step 304 straight from step 302. In step 304 it is checked whether the response included the address of the recommended gateway support node GGSN in addition to the cause. If it includes the address, it is checked in step 305 whether the same GGSN address is on the GGSN list of the SGSN. If it is listed, it is marked as used on the SGSN's own list in step 306, after which we move to step 307. By marking

the node as used we ensure that two create requests are not sent to the same GGSN. If the SGSN's list does not include the GGSN address, we move straight to step 307 where a 'Create PDP Context' request is sent to the GGSN indicated in the negative response. In step 308 a response is received

5   from the GGSN. In step 309 it is checked whether the response was negative. If it was negative, we move to step 304 to check whether the response included the GGSN address in addition to the cause. If the response was positive (Create PDP Context Request (request accepted) or Create AA PDP Context (request accepted)), a PDP context is activated in step 310 and a

10   tunnel established between the serving support node SGS and the gateway support node GGSN in step 311.

        If it is noted in step 304 that the negative response did not include the GGSN address, it is checked in step 312 whether there are unused GGSN addresses on the GGSN list of the serving support node. If this is the case, the

15   address on the top of the list is chosen in step 313 and marked as used in step 314, after which we move to step 307 to send a 'Create PDP Context' request. When this route is used, the create request is always sent to the GGSN selected from the SGSN's own list. If it is noted in step 312 that there are no unused GGSN addresses on the list of the serving support node, a failure will

20   occur (step 315) and packets cannot be transmitted.

        In some other preferred embodiments of the invention steps 305, 306, 312, 313 and 314 are not performed at all. In that case the gateway support node is solely responsible for finding the alternative gateway support node.

25   The steps described in Figures 2 and 3 are not in absolute chronological order and some of the steps can be performed simultaneously or in a different order. These steps include steps 202, 203 and 294 and steps 314 and 307. Other functions may also be performed between the steps, e.g. in Figure 2 data of the PDP context, such as the SGSN address, may be

30   updated, or the PDP context may be deleted in response to a delete request sent by the SGSN. It is also possible to wait for an acknowledgement from the serving support node between steps 212 and 213 of Figure 2 and delete the PDP context only in response to an acknowledgement which indicates that another tunnel has been established successfully. In the embodiments of the

35   invention where the negative response is used only when the tunnel is established, another message, e.g. delete or reset, is sent in step 212. In that

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case at least steps 302 and 303 are omitted from the example of Figure 3 when the negative response is received. When another message is received, these steps are performed.

Figures 4, 5 and 6 illustrate examples of signalling according to the invention in different embodiments. Signalling is based on ETSI recommendation GSM 09.60 version 6.2.0, which is incorporated herein by reference.

Figure 4 illustrates signalling related to PDP context activation. In the example of Figure 4 the mobile station MS sends an 'Activate PDP Context' request to the serving support node SGSN in message 4-1. Having received the message the serving support node SGSN and the mobile station MS carry out security functions in message 4-2. After the security functions have been performed, the serving support node SGSN sends a 'Create PDP Context' request to the gateway support node GGSN1 in message 4-3. Messages 4-1, 4-2 and 4-3 are in accordance with the prior art. Having received message 4-3 the gateway support node GGSN1 checks in step 4-4 whether the conditions (or condition) for acceptance are fulfilled. If necessary, the limit value related to the condition or the condition is retrieved from a database. This is not, however, shown in Figure 4. Examples of the conditions are given in connection with Figure 2. In the example of Figure 4 it is assumed that the GGSN1 cannot accept the PDP context request. Thus it requests the address of a more suitable GGSN from the database DB in message 4-5. The message may contain information on the condition which caused rejection and the cause of rejection. The message may also contain all parameters and attributes transmitted in message 4-3. The database retrieves the address GGSN2 on the basis of the information given in message 4-5 and sends it back in message 4-6. Messages 4-5 and 4-6 are not actual signalling messages. Messages 4-5 and 4-6 are used for indicating the database search performed in-this step. Having received message 4-6 the gateway support node GGSN1 sends a 'Create PDP Context' response the cause parameter of which differs from the 'request accepted value' to the serving support node SGSN in message 4-7. The message also contains the address of the GGSN2. The serving support node SGSN separates the address from message 4-7 in step 4-8 and sends a 'Create PDP Context' request to the gateway support node GGSN2 in message 4-9. Message 4-9 is in accordance with the prior art. Having received message 4-9 the gateway support node

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GGSN2 checks in step 4-10 whether the conditions (or condition) for acceptance are fulfilled. In this case the conditions (or condition) are fulfilled and the gateway support node GGSN2 sends a 'Create PDP Context' response the cause parameter of which is 'request accepted' to the serving

5   support node SGSN in message 4-11. In other words, message 4-11 is a positive response. The serving support node SGSN transmits the acceptance to the mobile station MS according to the prior art by sending an 'Active PDP Context' accept in message 4-12. After this the PDP context is activated from the mobile station, which can send and receive packets.

10   The PDP context activation illustrated in Figure 4 can be performed when the mobile station attaches to the GPRS network. Alternatively, the user may activate the context or activation may be performed in response to a PDP context activation request received from the GPRS network.

Figure 5 is a signalling chart illustrating a situation in which a tunnel

15   has been established between the SGSN and the GGSN2. In other words, the PDP contexts are active. In step 5-1 the operating conditions of the gateway support node change. For example, the operator drives the gateway support node down or the load of the gateway support node exceeds the limit value because the limit value has been changed. Change of the operating conditions

20   may also be an update of the PDP context received from the serving support node e.g. as the desired quality of service or the serving support node changes. Thus one end of the tunnel is to be transferred from the GGSN2 to another gateway support node. As a result of this, the gateway support node sends message 5-2 to the serving support node SGSN. Depending on the

25   embodiment, the message may be a 'Create PDP Context' response the cause parameter value of which differs from the 'request accepted' value, a 'Delete PDP Context' or a 'Resent PDP Context'. Regardless of the type of the message it always contains the address of a new, more suitable gateway support node GGSN3 which is either obtained from the operator or retrieved

30   from the database. Having sent the message the GGSN 2 deletes the PDP context in step 5-3, i.e. removes the tunnel. Having received message 5-2 the serving support SGSN removes the tunnel to the GGSN2 in step 5-4, separates the address from message 5-2 and sends a 'Create PDP Context' request to the gateway support node GGSN3 in message 5-5. Having

35   received message 5-5 the gateway support node GGSN3 checks in step 5-6 whether the conditions (or condition) for acceptance are fulfilled. This time the

conditions (or condition) are fulfilled and the gateway support node GGSN3 sends a 'Create PDP Context' response the cause parameter of which is 'request accepted' to the serving support node SGSN in message 5-7. Thereafter the SGSN establishes a new tunnel and continues transmission of
5   packets using this new tunnel. The mobile station does not need to be informed of the new tunnel.

If the conditions are not fulfilled in step 5-6, the gateway support node proposes another gateway support node. If no suitable gateway support node is found, a failure will occur and packets can no longer be transmitted.
10   Figure 6 illustrates a signalling chart of a situation in which a tunnel has been established between the SGSN and the GGSN2. In other words, the PDP contexts have been activated. In step 6-1 the operating conditions change. For example, the load of the gateway support node exceeds the limit value because the limit value has been changed. As a result, the gateway
15   support node sends message 6-2 to the serving support node SGSN. Preferably the message is 'Reset PDP Context'. Message 6-2 contains the address GGSN3 of a new, more suitable gateway support node which is either obtained from the operator or retrieved from the database. Having received message 6-2 the serving support node separates the address from message
20   6-2 in step 6-3 and sends a 'Create PDP Context' request to the gateway support node GGSN3 in step 6-4. Having received message 6-4 the gateway support node GGSN3 checks in step 6-5 whether the conditions (or condition) for acceptance are fulfilled. This time the conditions (or condition) are fulfilled and the gateway support node GGSN3 sends a 'Create PDP Context'
25   response the cause parameter of which is 'request accepted' to the serving support node SGSN in message 6-6. Having received the positive response in message 6-6 the SGSN removes the tunnel to the GGSN2 in step 6-7 by sending a positive acknowledgement (ResetPDPContextAck) to the GGSN2. In step 6-8 the SGSN creates a new tunnel with the GGSN3 and continues
30   transmission of packets using this new tunnel. The mobile station does not need to be informed of the new tunnel. When the GGSN2 receives a positive acknowledgement, it deletes the PDP context in step 6-9.

If the conditions are not fulfilled in step 6-5, the gateway support node GGSN3 sends a negative response (e.g. message 4-7 of Figure 4),and
35   the SGSN may try to establish a tunnel with the gateway support node suggested by the GGSN3. If the SGSN received the negative response

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without a new gateway support node address, it will send a negative acknowledgement to the GGSN2 and will not remove the tunnel with it. In that case the GGSN2 searches for another PDP context which it tries to transfer to another gateway support node to divide the load evenly. Alternatively, having received the negative response from the GGSN3 the SGSN can always send a negative acknowledgement to the GGSN2, which may also search for a new gateway support node address to be sent to the SGSN.

A preferred embodiment of the invention utilizes each of the signalling types illustrated in Figures 4, 5 and 6. Depending on the change of operating conditions detected in the gateway support node either signalling 5 or signalling 6 is selected e.g. according to the instructions given by the operator. The instructions may be included in the condition. Signalling 5 is selected when the operator drives the gateway support node down, for example, whereas signalling 6 is selected in connection with the update of the PDP context. In this embodiment messages 5-2 and 6-2 must differ from each other so that the serving support node knows which signalling is concerned. The simplest way to distinguish one message from the other is to use messages with different names.

In preferred embodiments of the invention it is possible to use only one or two of the examples illustrated in Figures 4, 5, 6.

The steps and signalling messages shown in Figures 4, 5 and 6 are not in absolute chronological order and some of the steps may be performed simultaneously or in a different order. The signalling messages are only exemplary and may even comprise several separate messages for transmitting the same information. In addition, the messages may contain other information. The messages can also be combined freely or divided into several parts. Furthermore, the names of the messages may differ from the above-mentioned ones. It is essential that the gateway support node is capable of sending control information to the serving support node when another gateway support node is more suitable than the current gateway support node. Depending on the network structure, other network elements between which different functionalities have been divided may participate in data transmission and signalling.

Even though in connection with Figures 4, 5 and 6 only ordinary PDP contexts have been used as examples, the same functionality of the

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invention is also applicable to PDP contexts of an anonymous user (anonymous access).

It will be obvious to a person skilled in the art that as technology develops, the inventive concept can be implemented in various ways. Thus the invention and its embodiments are not limited to the examples described above but may vary within the scope of the claims.

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CLAIMS

1. A method of controlling selection of a gateway support node to be used in a telecommunications system which comprises at least one support node serving a subscriber of the telecommunications system, a first and a second gateway support node,

c h a r a c t e r i z e d in that the method comprises the steps of:

defining at least one condition for the first gateway support node, so that when the condition is fulfilled, the second gateway support node is more suitable for transmitting packets,

detecting that the condition is fulfilled, and

sending a first message indicating the second gateway support node to the serving support node.

2. A method according to claim 1, **c h a r a c t e r i z e d** in that the method further comprises the steps of:

receiving in the first gateway support node a second message which indicates that a tunnel for transmitting packets between the subscriber and an external data network is to be established between the serving support node and the first gateway support node,

checking said condition, and

transmitting a first message to the serving support node if said condition is fulfilled, or

establishing a tunnel if said condition is not fulfilled.

3. A method according to claim 2, **c h a r a c t e r i z e d** in that if the tunnel is established between the serving support node and the first gateway support node, the method further comprises the steps of:

detecting a change in operating conditions in the first gateway support node,

checking said condition, and

transmitting a third message indicating said second gateway support node to the serving support node and removing the tunnel in the first gateway support node if said condition is fulfilled.

4. A method according to claim 3, **c h a r a c t e r i z e d** in that the system is a GPRS system and said first and third messages are response messages to a 'Create PDP Context' request.

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5. A method according to claim 2, c h a r a c t e r i z e d in that if the tunnel is established between the serving support node and the first gateway support node, the method further comprises the steps of:

detecting a change in operating conditions in the first gateway
5   support node,

checking said condition, and

performing the next steps if said condition is fulfilled:

transmitting a fourth message indicating said second gateway support node to the serving support node,

10   waiting for an acknowledgement to said fourth message,

receiving the acknowledgement, and

removing the tunnel in the first gateway support node in response to a positive acknowledgement.

6. A method according to claim 5, c h a r a c t e r i z e d in that the
15   system is a GPRS system and said first and fourth messages are response messages to a 'Create PDP Context' request.

7. A method according to claim 1, c h a r a c t e r i z e d in that the method further comprises the steps of:

establishing a tunnel between the serving support node and the first
20   gateway support node,

detecting a change in operating conditions in the first gateway support node,

checking said condition, and

transmitting a first message to the serving support node if said
25   condition is fulfilled.

8. A method according to claim 7, c h a r a c t e r i z e d by, if fulfilment of said condition is detected, removing the tunnel in the first gateway support node in response to the transmission of said first message.

9. A method according to claim 7, c h a r a c t e r i z e d by, if
30   fulfilment of the condition is detected,

waiting for an acknowledgement to the first message,

receiving the acknowledgement, and

removing the tunnel in response to a positive acknowledgement.

10. A packet-switched telecommunications system comprising

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a support node (SGSN) serving the subscriber of the telecommunications system, a first and a second gateway support node (GGSN1, GGSN2, GGSN3), **c h a r a c t e r i z e d** in that

5   in response to fulfilment of a predefined condition, the first gateway support node (GGSN1) is arranged to send to the serving support node (SGSN) a first message indicating the second gateway support node (GGSN2, GGSN3) which is more suitable for transmitting packets, and

in response to receiving the first message, the serving support node (SGSN) is arranged to activate establishment of the tunnel to be used in

10   transmission of packets with the second gateway support node (GGSN2, GGSN3) indicated.

11. A telecommunications system according to claim 10, **c h a r a c t e r i z e d** in that

the telecommunications system comprises a database (DB) where

15   information on the second gateway support nodes (GGSN2, GGSN3) defined for the first gateway support node (GGSN1) is maintained, and

the first gateway support node (GGSN1) is arranged to retrieve the most suitable second gateway support node (GGSN2) from the database when the predefined condition is fulfilled.

20   12. A telecommunications system according to claim 10 or 11, **c h a r a c t e r i z e d** in that the first gateway support node (GGSN1) is arranged to check at least one predefined condition in response to receiving a message requesting establishment of a tunnel from the serving support node (SGSN).

25   13. A telecommunications system according to claim 10, 11 or 12, **c h a r a c t e r i z e d** in that

the telecommunications system comprises a tunnel used for transmitting packets between the serving support node (SGSN) and the first gateway support node (GGSN1), and

30   the first gateway support node (GGSN1) is arranged to detect a change in operating conditions and check at least one of said predefined conditions in response to detecting the change.

14. A gateway support node (GGSN1, GGSN2, GGSN3) of a packet network which is arranged to communicate with the support node

35   (SGSN) serving a subscriber of the packet network, **c h a r a c t e r i z e d** in that

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the gateway support node (GGSN1) is arranged to transmit, in response to fulfilment of a predefined condition, a first message indicating another gateway support node (GGSN2, GGSN3) which is more suitable for transmitting packets to the serving support node (SGSN).

5　　　　　15. A gateway support node according to claim 14, **c h a r a c t e r i z e d** in that the gateway support node (GGSN1) is arranged to check at least one said predefined condition in response to receiving a message requesting establishment of a tunnel from the serving support node (SGSN).

10　　　　　16. A gateway support node according to claim 14 or 15, **c h a r a c - t e r i z e d** in that

there is a tunnel used for transmitting packets between the gateway support node (GGSN1, GGSN2, GGSN3) and the serving support node (SGSN), and

15　　　　　the gateway support node (GGSN1, GGSN2, GGSN3) is arranged to detect a change in operating conditions and check at least one said predefined condition in response to detecting the change.

17. A support node (SGSN) serving a subscriber of a packet network which is arranged to communicate with at least a first and a second gateway

20　　support node (GGSN1, GGSN2, GGSN3) of the packet network, **c h a r a c - t e r i z e d** in that

the serving support node is arranged, in response to the address of the second gateway support node included in the message received from the first gateway support node (GGSN1), to activate establishment of a tunnel

25　　used for transmitting packets with said second gateway support node (GGSN2, GGSN3) .

18. A serving support node according to claim 17, **c h a r a c t e r i z e d** in that it is arranged to remove the existing tunnel to the first gateway support node (GGSN1) in response to activation of tunnel

30　　establishment with the second gateway support node (GGSN2, GGSN3).

19. A serving support node according to claim 17, **c h a r a c t e r i z e d** in that it is arranged to remove the existing tunnel to the first gateway support node (GGSN1) in response to successful establishment of a tunnel to the second gateway support node (GGSN2, GGSN3).
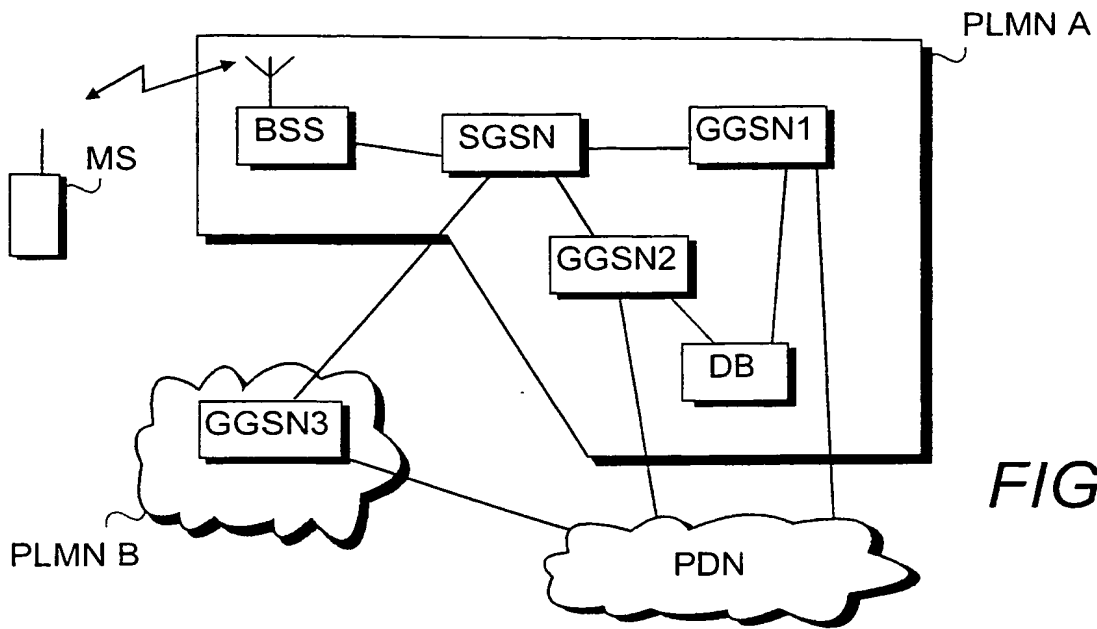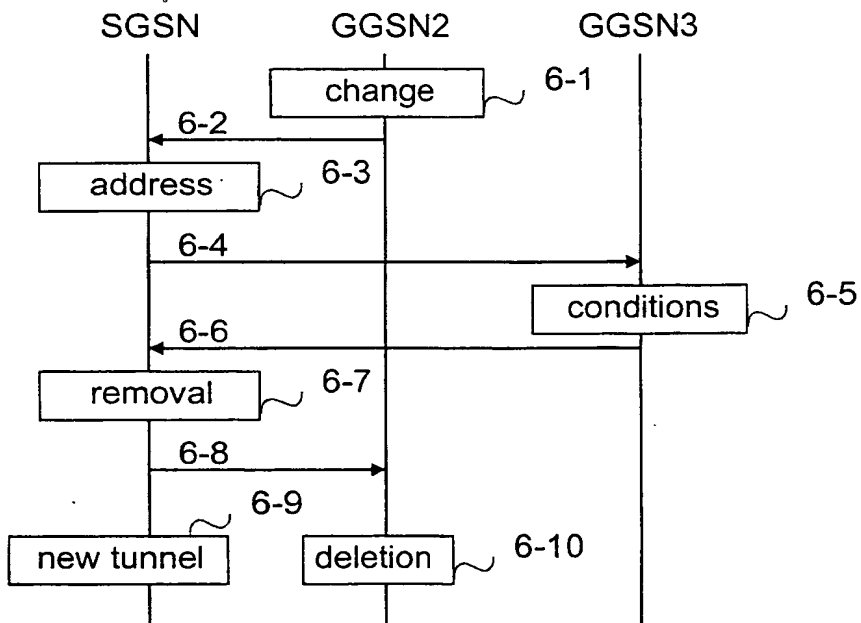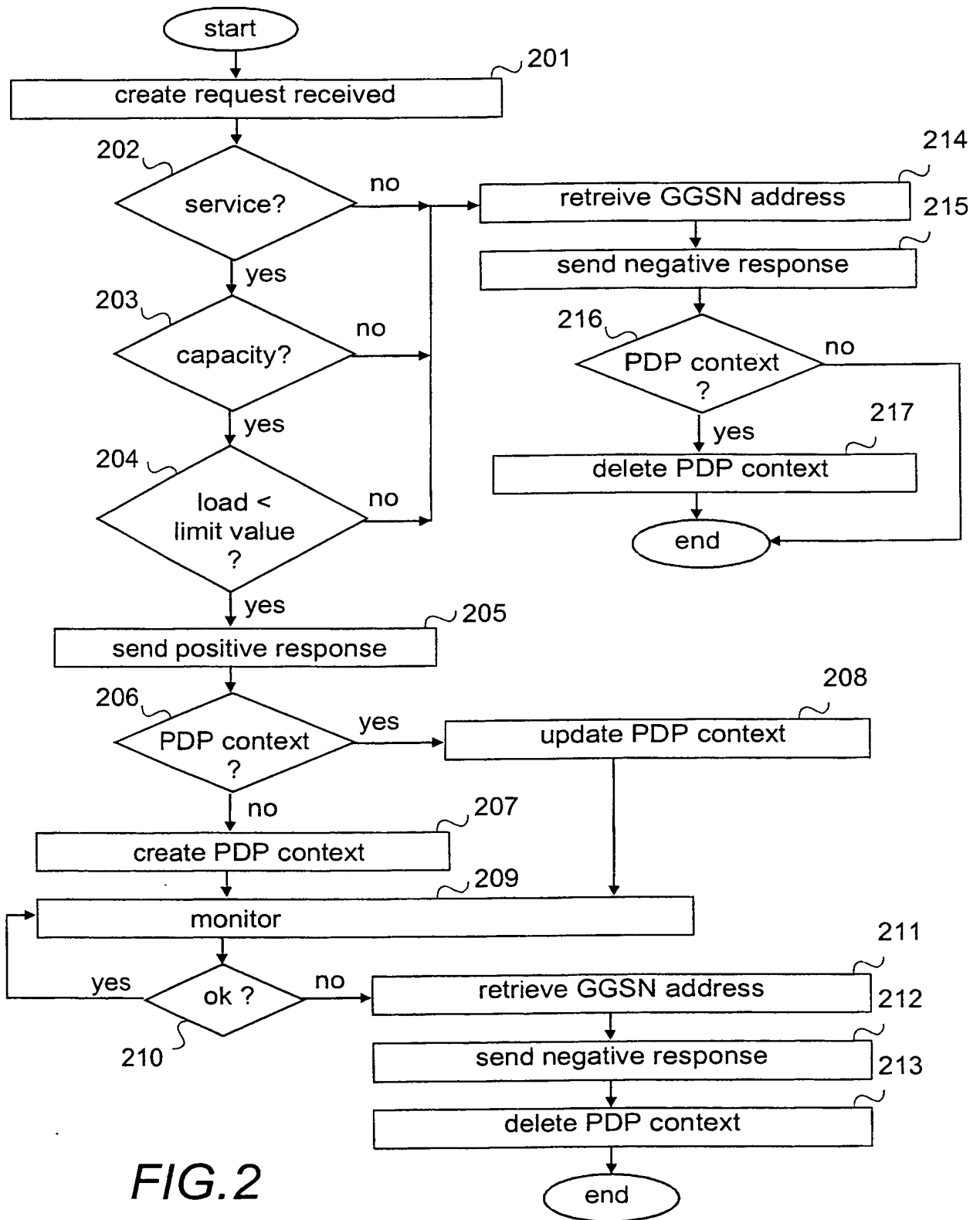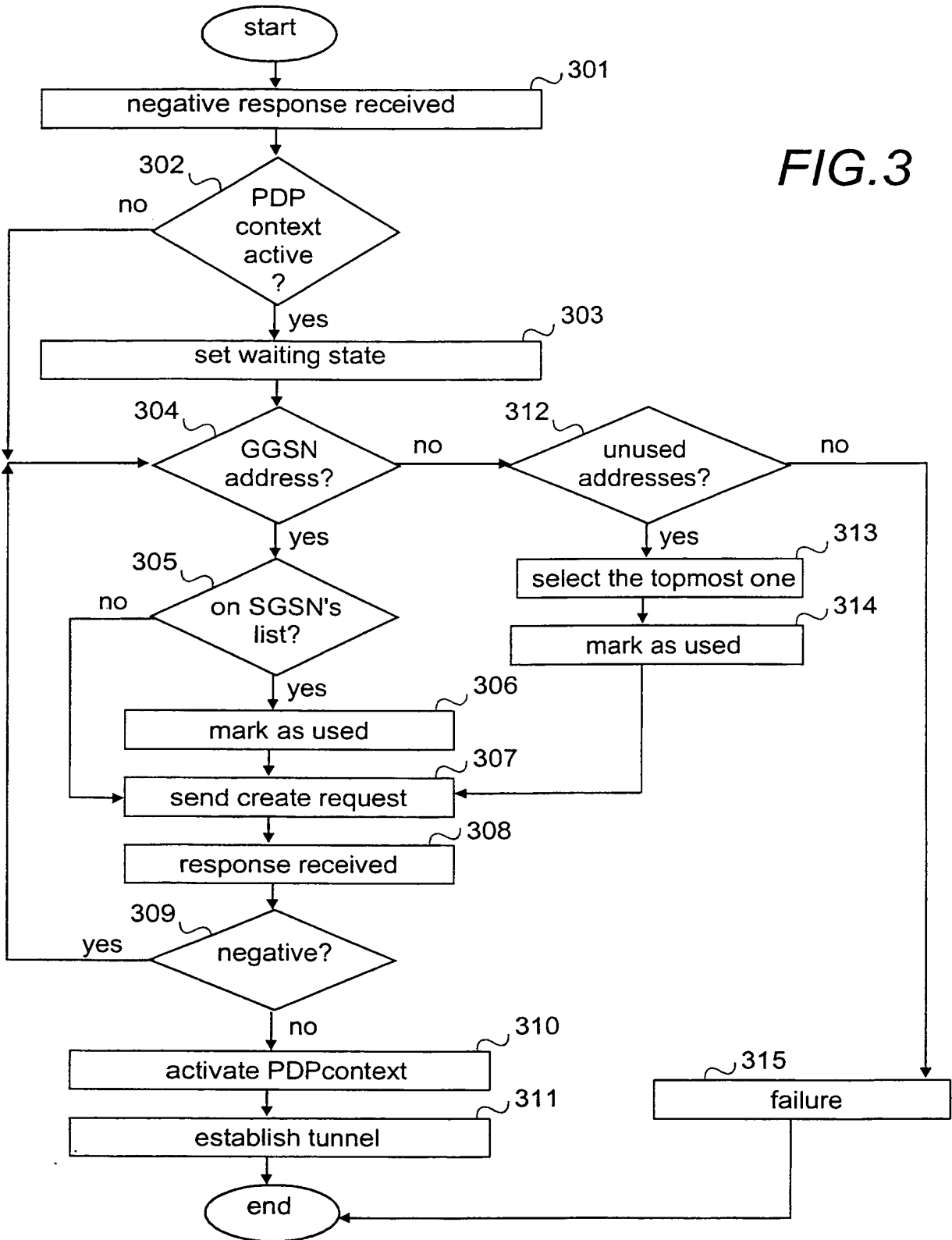
35

FIG.1

FIG.6

FIG.2

3/4

FIG.3

```
                    ( start )
                        │
        ┌───────────────▼───────────────┐  ⌇301
        │   negative response received   │
        └───────────────┬───────────────┘
                        │
      302 ⌇        ╱─────▼─────╲
        no        ╱    PDP      ╲
    ◄────────────    context     ──
    │             ╲   active    ╱
    │              ╲    ?      ╱
    │               ╲─────────╱
    │                    │ yes
    │        ┌───────────▼───────────┐  ⌇303
    │        │    set waiting state   │
    │        └───────────┬───────────┘
    │                    │
  304 ⌇           ╱──────▼──────╲    no      312 ⌇   ╱──────────╲   no
    │    ┌─────►╱    GGSN        ╲──────────►╱  unused   ╲──────────┐
    │    │      ╲   address?     ╱           ╲ addresses? ╱         │
    │    │       ╲──────────────╱             ╲──────────╱          │
    │    │              │ yes                      │ yes            │
  305 ⌇ │        ╱──────▼──────╲           ┌───────▼────────┐ ⌇313  │
    no  │  ┌───►╱  on SGSN's    ╲          │ select the topmost one │
    ◄───┼──┤    ╲    list?      ╱          └───────┬────────┘       │
    │   │  │     ╲─────────────╱                   │         ⌇314   │
    │   │  │            │ yes                ┌──────▼───────┐        │
    │   │  │     ┌──────▼──────┐ ⌇306        │ mark as used │        │
    │   │  │     │ mark as used │            └──────┬───────┘        │
    │   │  │     └──────┬──────┘                    │                │
    │   │  │            │         ⌇307              │                │
    │   │  └───►┌───────▼───────────┐◄──────────────┘                │
    │   │       │ send create request│                               │
    │   │       └───────┬───────────┘                               │
    │   │               │            ⌇308                            │
    │   │       ┌───────▼───────────┐                               │
    │   │       │  response received │                               │
    │   │       └───────┬───────────┘                               │
    │ 309 ⌇      ╱──────▼──────╲                                     │
    │   yes     ╱               ╲                                    │
    └──────────    negative?     ──                                  │
                ╲               ╱                                    │
                 ╲─────────────╱                                     │
                        │ no                                         │
                ┌───────▼──────────┐ ⌇310                            │
                │ activate PDPcontext│                               │
                └───────┬──────────┘   ⌇311       ⌇315              │
                ┌───────▼──────────┐        ┌──────────────┐◄────────┘
                │  establish tunnel │        │   failure    │
                └───────┬──────────┘        └──────┬───────┘
                        │                          │
                    ( end )◄───────────────────────┘
```

MS	SGSN	GGSN1	GGSN2	DB

4-1

4-2

4-3

conditions 4-4

4-5

4-6

4-7

address 4-8

4-9

conditions 4-10

4-11

4-12

FIG.4

SGSN	GGSN2	GGSN3

change 5-1

5-2

removal, address

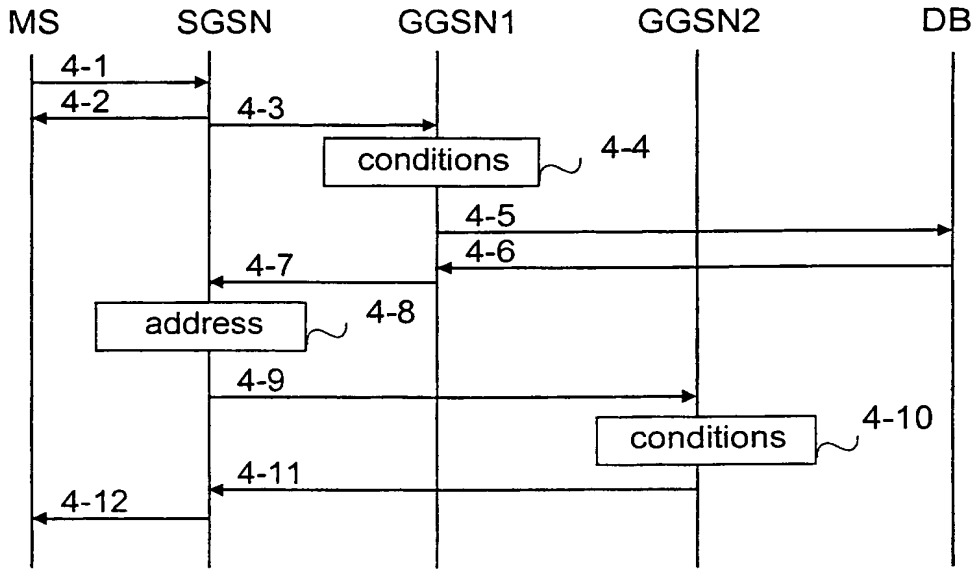deletion 5-3
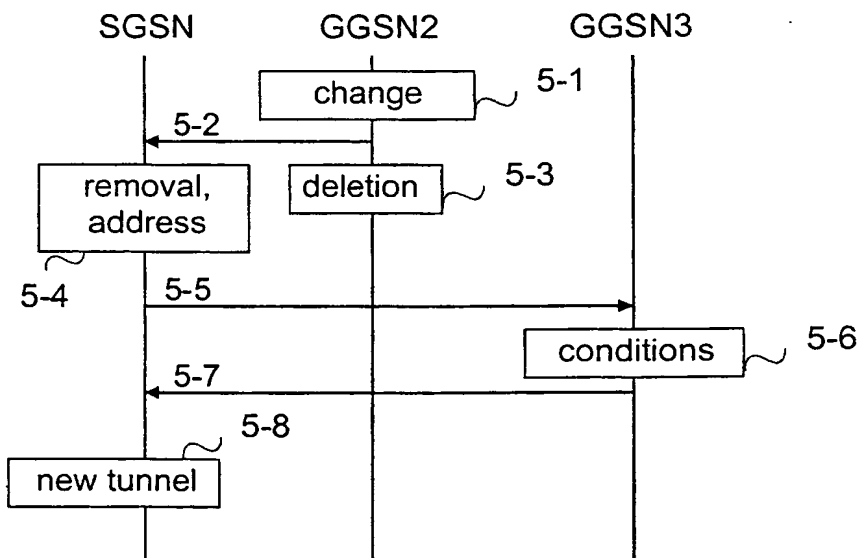
5-4

5-5

conditions 5-6

5-7

5-8

new tunnel

FIG.5

INTERNATIONAL SEARCH REPORT

International application No.

PCT/FI 99/01083

A. CLASSIFICATION OF SUBJECT MATTER

IPC7: H04Q 7/22, H04L 12/56

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: H04Q

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
E,X	WO 14981 A1 (TELIA AB (PUBL)), 16 March 2000 (16.03.00), see the whole document	1,10-12, 14-15,17
A	US 5752162 A (STEVEN PAUL SAWYER ET AL), 12 May 1998 (12.05.98), column 2, line 66 - column 5, line 13	1,10,14,17
A	WO 9859468 A2 (NOKIA TELECOMMUNICATIONS OY), 30 December 1998 (30.12.98), page 6, line 6 - line 22	1,10,14,17

☐ Further documents are listed in the continuation of Box C.   ☒ See patent family annex.

* Special categories of cited documents:	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A" document defining the general state of the art which is not considered to be of particular relevance	
"E" erlier document but published on or after the international filing date	"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"O" document referring to an oral disclosure, use, exhibition or other means	
"P" document published prior to the international filing date but later than the priority date claimed	"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
8 June 2000	0 9 -06- 2000
Name and mailing address of the ISA/	Authorized officer
Swedish Patent Office Box 5055, S-102 42 STOCKHOLM Facsimile No. + 46 8 666 02 86	Jaana Raivio/mj Telephone No. + 46 8 782 25 00

Form PCT/ISA/210 (second sheet) (July 1992)

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22.12.1999

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Patenttihakemus nro:	982855
Luokka:	H04Q / JSA
Hakija:	Nokia Networks Oy
Asiamies:	Kolster Oy Ab
Asiamiehen viite:	, 2980715FI
Määräpäivä:	22.06.2000

Patenttihakemuksen numero ja luokka on mainittava kirjelmässänne PRH:lle

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Suoritetussa tutkimuksessa ei tullut esiin estettä hakemuksen hyväksynnälle. Hakijaa kehotetaan toimittamaan virastoon suomenkielisiä vaatimuksia vastaavat ruotsinkieliset vaatimukset.

Esimerkkinä tutkimuksessa esille tulleista julkaisuista liitetään oheen hakijan aiempi hakemusjulkaisu WO 98/59468, joka käsittelee palvelevan tukisolmun vaihtoa.
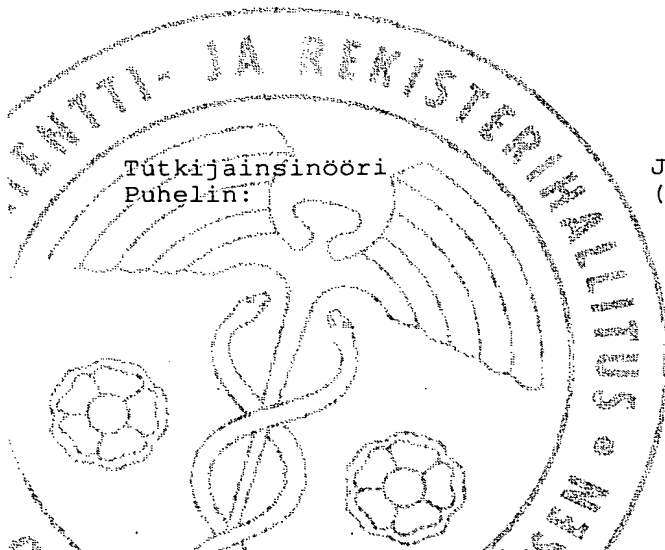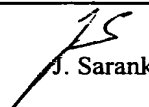
Tutkijainsinööri   Jukka Saranka
Puhelin: (09) 6939 5394

Lausumanne huomautusten johdosta on annettava viimeistään yllämainittuna määräpäivänä. Jollette ole antanut lausumaanne virastoon viimeistään mainittuna määräpäivänä tai ryhtynyt toimenpiteisiin tässä välipäätöksessä esitettyjen puutteellisuuksien korjaamiseksi, jätetään hakemus sillensä, (patenttilain 15 §). Sillensä jätetty hakemus otetaan uudelleen käsiteltäväksi, jos Te neljän kuukauden kuluessa määräpäivästä annatte lausumanne tai ryhdytte toimenpiteisiin esitettyjen puutteellisuuksien korjaamiseksi ja samassa ajassa suoritatte vahvistetun maksun, 320 mk hakemuksen ottamisesta uudelleen käsiteltäväksi. Jos lausumanne on annettu virastoon oikeassa ajassa, mutta esitettyjä puutteellisuuksia ei ole siten korjattu, että hakemus voitaisiin hyväksyä, se hylätään, mikäli virastolla ei ole aihetta antaa Teille uutta välipäätöstä (patenttilain 16 §). Uusi keksinnön selitys, siihen tehdyt lisäykset ja uudet patenttivaatimukset on aina jätettävä kahtena kappaleena ja tällöin on otettava huomioon patenttiasetuksen 19 §.

PATENTTIHAKEMUS NRO	LUOKITUS
982855	H04Q 7/22; H04L 12/56

TUTKITTU AINEISTO

Patenttijulkaisukokoelma (FI, SE, NO, DK, DE, CH, EP, WO, GB, US), tutkitut luokat

Tiedonhaut ja muu aineisto

Haku Epodoc tietokannassa termeillä: GGSN ja Gateway GPRS Support Node

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VIITEJULKAISUT

Kategoria*)	Julkaisun tunnistetiedot	Koskee vaatimuksia
A	WO 98/59468 lk H04L 12/56, Nokia Telecommunications Oy	

*)   X   Patentoitavuuden kannalta merkittävä julkaisu yksinään tarkasteltuna
     Y   Patentoitavuuden kannalta merkittävä julkaisu, kun otetaan huomioon tämä
        ja yksi tai useampi samaan kategoriaan kuuluva julkaisu
     A   Yleistä tekniikan tasoa edustava julkaisu, ei kuitenkaan patentoitavuuden este

Päiväys	Tutkija
22.12.1999	J. Saranka